NASA SBIR/STTR Technologies

H8.03-8031 - Affordable, Lightweight, Compactly Stowable, High Strength / Stiffness Lander Solar Array

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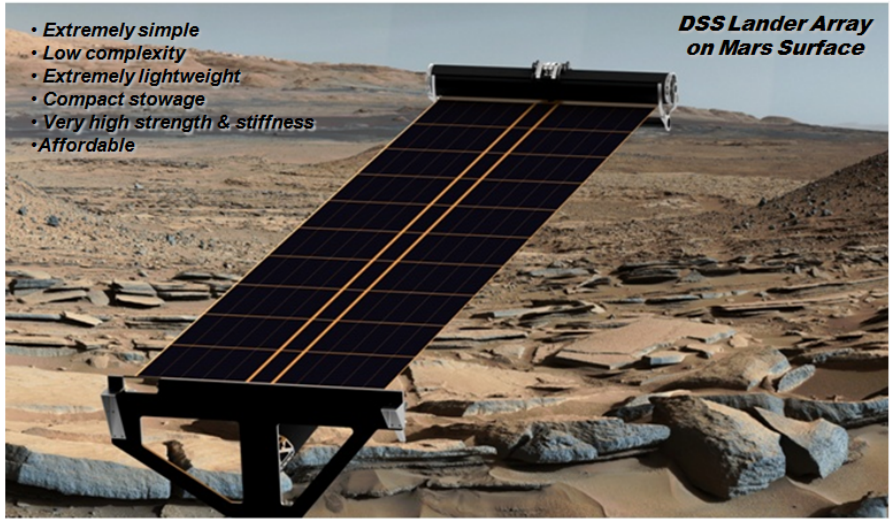
Identification and Significance of Innovation

Technology significance: Enables compact stowage, lightweight, high deployed strength, high deployed stiffness, and affordability for future NASA and non-NASA missions, particularly Lander and sample return missions. Provides revolutionary performance: 1) Ultra-affordable (up to 25% projected cost savings), 2) Ultra-lightweight / high specific power (up to 150 W/kg BOL for a Lander application, PV-blanket dependent), 3) Ultra-compact stowage volume (10X times better than rigid panel arrays, and 26% better than the basic ROSA technology), 4) High deployed stiffness (up to 10X better than rigid panel arrays), 5) High deployed strength (3G+ capable demonstrated - 10X better than rigid panel arrays), 6) High flexibility/durability and robust construction, 7) High modularity and scalability, 8) Accommodates all photovoltaic types, 9) Applicability & scalability to many missions / power ranges (200W to 10's of kW), 10) Excellent environmental survivability, 11) High reliability, 12) Retract-ability and re-deployment potential, and 13) Commercial infusion path identified.



Estimated TRL at beginning and end of contract: (Begin: 4 End: 6)

Technical Objectives and Work Plan

Overall technical objectives: 1) Demonstrate TRL 5/6 and develop an innovative low cost, low mass, compact stowed packaging, low risk, and highly reliable Lander array that enables future NASA Lander and sample return missions, 2) Advance and mature the innovative technology embodiment and establish compliancy with the following requirements/goals: Low mass / high specific power (Goal: up to 150 W/kg BOL for ZTJ PV), Affordability (Goal: 25% cost savings), Compact stowage volume (Goal: 60 kW/m3, or volume compliance within typical Lander volumes, and up to a 25% improvement to the basic platform technology), High deployed strength and 1G deployment capability (Goal: 3G deployed load capability, capable of withstanding 100-m/sec Mars atmospheric winds, non-offloaded deployment under 1G), Compatible and survivability in typical space and Lander / sample return mission environments, 3) Build/Test a deployable TRL 5/6 prototype hardware and perform wing-level validation test (deployments in ambient and hot/cold temperatures, strength / stiffness, vibration survivability); 4) Accomplish the objectives working concurrently with NASA & commercial end-users; and 5) Accelerate commercial infusion and NASA's ROI by involving the numerous end-users.

NASA Applications

The technology is particularly suited for Lander and sample return missions that require game-changing performance in terms of affordability, high power, compact stowed packaging, high deployed strength and stiffness, unsupported deployment in 1G, and lightweight. NASA space applications are comprised of practically all Exploration, Space Science, Earth Science, Planetary Surface, and other missions.

Non-NASA Applications

The technology is particularly suited for reconnaissance missions that require game-changing performance in terms of affordability, ultra-lightweight, compact stowage volume, and high deployed strength and stiffness. The technology is applicable for non-NASA LEO, MEO & GEO missions.

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